Govan Mbeki Mathematics Development Unit (GMMDU) in the news

Maths unit boosts pupils' X factor

An offline tutoring programme is giving talented but sidelined pupils a fighting chance
WERNER OLIVIER

Add it up: A new tutoring model is succeeding in areas where pupils tend to fare poorly at maths and science. Photo: Cedric Petersen/Maths Centre

Democracy may have come of age this year, but an education crisis remains in the majority of South Africa's schools — particularly when it comes to mathematics and science.

In fact, last year's World Economic Forum survey put mathematics and science education in South Africa at the very bottom of the list — 148th out of 148.

So it is nothing short of remarkable when a pupil in a historically disadvantaged school in a rural Eastern Cape district achieves 96% for maths and 92% for science. This is what 18-year-old Mava Qolo did last year, becoming the top-achieving pupil in previously disadvantaged schools in the Cradock district. It is also remarkable that Cradock, out of 84 districts assessed for improvements in mathematics over the past four years, has been recognised as the third-best nationally and second-best for improvement in physical science over the same period.

Four years ago, an innovative, technology-linked offline teaching and learning model for maths and science, developed by the Govan Mbeki Mathematics Development Unit at the Nelson Mandela Metropolitan University, was first introduced in this district.

But before one looks at the model, and without a doubt at the role it has played in Qolo's and Cradock's success, it is important to examine the broader context of education in rural South Africa.

The first factor to take into consideration is the legacy of apartheid, when the government largely ignored schools for black pupils, particularly in rural areas.

The second is that, although the post-1994 government has made attempts to put things right, some strategies seem to have had the opposite effect.

Some of the macro strategies by leaders in education, including experimenting with outcomes-based education and the closure of all teacher training colleges, appear tohave contributedto thefurther demise of mathematics and science education.

At the heart of the problem is the fact that there are huge deficits in school management and too few teachers of mathematics and science who meet the minimum standards. Many teachers are unqualified or underqualified, and little is being done to encourage and support them to improve their subject knowledge.

What is more, most teachers are teaching in the same way they have done for decades, using the old "sit, get and forget" model, and making no attempt to tune into the changing needs of today's techno-savvy pupils, who need to become productive digital citizens in a socially connected 21st-century world.

It is the pupils who ultimately suffer. Many drop out of school before getting to matric, and our matric pass rates and standards are low.

Not nearly enough pupils qualify for science, engineering, technology and related courses at universities and colleges, and those who do are often not well equipped enough to cope with the demands of tertiary education.

This is the context that inspired the creation of the Govan Mbeki Mathematics Development Unit in 2002, and that has governed all its programmes ever since.

For the past 13 years, the unit and, for the past five years, the FirstRand Foundation chair in mathematics education, both of which are based at the Nelson Mandela Metropolitan University, have been working on a teaching and learning model that gives pupils in the worst Eastern Cape schools a leg up — a chance at boosting their marks and qualifying for tertiary education.

The maths unit, which won a national Impumelelo Social Innovations Gold award in December 2013, has always focused on urgent short-term solutions to help pupils with potential, such as Qolo, who were caught in a vicious education spiral but who aspired to acquire a post-school qualification.

The model has evolved to the point where the entire curriculum formaths andscience in grades 10, 11 and 12 — in the form of video-based lessons, animated PowerPoint presentations, calculators and exam revision videos, experiments, simulations and other visual and high-tech digital resources — is available offline on a tablet for pupils.

It is offline because most of the schools in the unit's target areas have no access to the internet.

But, even where internet connections are available, several serious challenges stand in the way of quality learning. These include a lack of adequate security at schools and a lack of technology support for teachers, who also lack the skills to use web-based material. And, of course, load-shedding is a factor.

The maths unit's offline model, with a tablet that can maintain its charge for several hours, overcomes these challenges.

In parallel, and through each stage of its development, the FirstRand chair has tested the model in 10 Port Elizabeth schools, constantly improving it, based on feedback and its success in practice.

The central support package for the techno-blended model, called TouchTutor, also has interactive self-assessment and feedback, and a Mxit-based maths and science curriculum support system.

How it works is that pupils with potential (picked by the unit, in collaboration with the department of basic education) are introduced to the Android tablets by an incubator school programme run over 14 Saturdays, or an after-school tablet- assisted peer-support programme, run on school days.

In general, pupils who attend the incubator school programme or after-school tablet-assisted peer-support programme, and who receive the tablets, which are for use after school hours as personal tutors, improve their marks by at least 10%.

Qolo, who attended Matthew Goniwe High in Cradock, attended an incubator school programme. He said one of the main problems he experienced throughout his school career was that his teachers lacked sufficient knowledge of the subjects they were teaching. Armed with the tablet, he could fill in the gaps.

In his words, the incubator school programme was "the greatest resource". Already a self-motivated pupil, who used to memorise his textbooks and use Google for extra information, the addition of the incubator school programme and tablet saw his marks going from 60% to 69% in grade 10 and 80% to 100% in Grade 12.

He is now studying mechatronics at the Nelson Mandela Metropolitan University.

His results are even more impressive when seen in the context of the Eastern Cape's poor pass rates for maths and science, which last year were 42% for maths, the second lowest in South Africa, and 51% for science, the country's lowest. National pass rates were 53% for maths and 61% for science.

The maths unit has also developed a university-accredited professional skills development programme for in-service maths and science teachers that uses the offline teaching and learning model, and has become a second central focus of the unit.

TouchTutor is available on laptops for teachers for use as a classroom resource. There is also a desktop model for pupils. The unit and the FirstRand Foundation chair have placed desktop resource centres in more than 100 Eastern Cape schools over the past year.

In April, the unit received a letter from Edgar Klaasen, Cradock's acting district director, informing it of the district's impressive national achievements. It stated that the unit's educator training and incubation school programme had "contributed significantly to our mathematics and physical science grade 12 results over the past four years … These accolades would most definitely not have come our way without your intervention."

Since 2010, the unit's interventions have reached more than 2000 selected pupils and more than 700 in-service teachers in the Eastern Cape and further afield. Scores of pupils have emerged from the incubator school programme with improved skills and have successfully progressed within study programmes at higher education institutions over the past five years.

This year, 750 grade 11 and 12 pupils from more than 80 mostly under-resourced Eastern Cape schools are busy completing one or other of the programmes. Qolo's story, Cradock's story, and other similar success stories linked to the development programme, are what the unit and the chair's efforts are all about — to harness the potential of modern off-line technologies in an innovative way to ensure that pupils with potential progress, despite the sometimes overwhelming challenges that exist in schools.

In recent years, the department of education has chosen to work closelywith both the unit and the chair to ensure that an accredited and more sustainable professional development programme for in-service mathematics teachers is implemented in the Eastern Cape. As a result, the unit's reach has been extended to 12 of the 23 districts of the Eastern Cape, and also to the Free State, and it is hoped that this model can be duplicated in other areas to empower as many teachers and pupils as possible.

Professor Werner Olivier heads the Govan Mbeki Mathematics Development Unit and also occupies the FirstRand Foundation chair in mathematics education, both at the Nelson Mandela Metropolitan University. He won the university's Engagement award for 2014

GRAAFF-REINET ADVERTISER & KAROONUUS
10 Feb 2012, p.7

Wiskunde en Wetenskap kry aandag van NMMU

CRADOCK — 'n Intensiewe poging om die swak 33% wiskunde en wetenskap slaagsyfers in die provinsie te verbeter is die afgelope naweek op Cradock en Graaff-Reinet geloots.

'n Soortgelyke inkubasieprogram is reeds 'n tyd gelede op Somerset-Oos van stapel gestuur.

Prof Werner Olivier van NMMU wat die program kom bekend stel het, het die belangrikheid van hierdie opleiding beklemtoon en gesê dit is veral in die lig van voorgestelde projekte soos die windplaas by Kookhuis en die suikerbeetfabriek by Cradock, baie belangrik dat studente se slaagsyfer verbeter sodat hulle die korrekte vaardigheidsopleiding vir hierdie nuwe uitdagings kan ontvang.

Die ongeveer 90 Graad 11 en 12 leerlinge van onderskeie skole in die departement van onderwys en opleiding se Cradock distrik wat Saterdag die bekendstelling (op Cradock) bygewoon het, is spesiaal genomineer vir die program en sal vir die volgende 14 Saterdae klasse by Hoërskool Cradock bywoon.

Die program sluit ook vervoer vir die leerders na en van die sentrum in.

Benewens opleiding deur spesiaal uitgesoekte onderwysers en ander fasilleerders, het elke leerling ook tekspboeke, skryfbehoeftes, leeraktiwiteite-handleidings, DVD reekse wat wiskunde en wetenskap leerplanne volledig dek en wat eintlik vir elke leerling 'n persoonlike studieleier is, eksamenvoorbereiding DVD's en 'n Casio sakrekenaar en DVD wat volledig beskryf hoe om wiskundeprobleme gekoppel aan die nuwe leerplan op te los, gratis ontvang. Die waarde van hierdie toerusting alleen word op R3 000 per leerling bereken en sal die ontvangers in staat stel om self hul opleiding uit te brei.

Leerlinge sal spesiale opleiding in die gebruik van hierdie sakrekenaars ontvang en daar is ook 'n spesiale afdeling wat hulle sal voorberei op die eksamen.

Die projek in die plattelandse gebiede word geborg deur onder meer MerSeta, Chevron en SED Alliance.

Die waarde word op ongeveer R500 000 bereken.

Peter Weiswange (NNMU), Prof Werner Olivier (NNMU), Retha Olivier (Hoërskool Cradock), Edgar Klaasen (Dept Onderwys en Opleiding, Cradock), Philip Jansen (Middelburg), Dr Hennie Boshoff (NNMU), Richard Schulze (Dept Onderwys en Opleiding, Cradock). Afwesig Susan Thomas en Ina Marais.

GRAAFF-REINET ADVERTISER & KAROONUUS
10 Feb 2012, p.15

Great opportunity for Mathematics and Science learners

The top learners will also take part in a Mathematics Olympiad later on in the year

GRAAFF-REINET — Last Saturday saw the launch of the 2012 Incubator School Project at the Spandau Secondary School.

This project, funded by the Chevron Corporation that is ranked as one of the world's leaders in integrated energy, at a cost of R500 000, was presented by the Govan Mbeki Mathematics Development Unit (GMMDU), an arm of the Nelson Mandela Metropolitan University (NMMU).

At the helm was professor Werner Olivier, First Rand National Chair of the GMMDU, assisted by retired Doctor Hennie Boshoff and Peter Weiswange.

The project's focus is on Mathematics and Science, and the aim is to empower young minds and to build academic confidence, plus to increase the numbers of Grade 11 and 12 learners succeeding in these subjects. Similar incubator schools now exist in PE, Somerset East, Cradock and now Graaff-Reinet.

A total of 90 learners will receive DVDs, top-of-the-range Casio calculators, resource material, certificates, meals, transport, bursaries and prizes. Tuition will take place at Spandau Secondary School for 14 weeks from 8am to 1pm. Learners will be tested every week and have to sign a 'Memorandum of Understanding' as part of their commitment to give of their best.

"Share the material with other learners as this is an opportunity of a lifetime" said Olivier.

The top learners will also take part in a Mathematics Olympiad later on in the year.

Olivier also expressed his wish that many of the learners taking part in this project would actually qualify for a bursary at NMMU.

In response to a question from the floor, Olivier stated that tuition for Grade 10s is also in the pipeline.

Peter Weiswange, who is responsible for the Science tuition stated that success is the sum of small efforts, repeated day in and day out.

■ The Graaff-Reinet staff appointed to see to the efficient running of the programme consists of AV Christoffels (co-ordinator), R Diza (Mathematics), B Koeberg (Mathematics) and E Lewis (Science).

Pierre de Villiers from the Department of Education thanked the presenters of the project and the service providers for their effort in making the launch a success.

Peter Weiswange, prof Werner Olivier and dr Hennie Boshoff, instigators of the Incubator School Project seen here with Pierre de Villiers from the Department of Education and Michael Lepotha, principal of Spandau Secondary School.

Benefiting from Tablets

Android tablets and MXit testing provided an über-modern approach to learning maths and science for 530 Grade 10 to 12 pupils from 80 previously-disadvantaged schools.

They were exposed to the technology as part of a one-year pilot study linked to Saturday maths and science "incubator" schools, which were run by Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU) in six districts of the Eastern Cape to supplement classroom instruction, which in many cases is not up to par.

The recent completion of the six schools – which took place in Port Elizabeth, Uitenhage, Humansdorp, Somerset East, Graaff-Reinet and Cradock – marked the successful end of the pilot study, in which the cutting-edge technology and support package called TouchTutorTM was implemented in the incubator schools.

GMMDU has run the constantly-evolving and expanding incubator schools for the past seven years – but this year was the first that every pupil received a tablet with curriculum-aligned video-based content to act as a "24/7 personal tutor". It was also the first year that allowed for independent self-assessment via MXit.

"It is the first time in South Africa a school like this has been run – it follows global trends in education," said GMMDU head Prof Werner Olivier.

The high-tech blended teaching and learning model was researched and developed by GMMDU and NMMU's First Rand Foundation research chair, occupied by Olivier. "We're aiming to use the latest technology to close the gap between teaching and learning, in terms of the expectations of the new Generation Z, which is also called the 'Facebook Generation' or the 'Screen Generation'."

The model, which blends different technologies, is not dependent on Internet access or Windows skills and its material is "100% aligned" to the new CAPS curriculum.

In anonymous feedback surveys carried out at the incubator schools, one pupil described the new technology as a "lifesaver". "It made learning fun, with access to information at my fingertips… It was a valuable friend that was lifesaving with maths and science."

Another wrote: "The tablet and TouchTutor really helped when I did not understand the teacher, I could just go home and look at the video of the topic I did not understand. It was a huge advantage and improved my understanding of maths a lot. Working through past question papers on the tablet also proved very useful."

Many wrote of improved school marks. "Not only has it helped me but it has also helped my friends," wrote another.

Olivier said the use of MXit for assessment was not without its challenges, which were being researched and addressed. "Essentially, you're taking maths as you see it in a textbook and putting it onto a [mobile
phone] screen. We're very excited about the possibilities."

Old exam papers and a glossary of maths and science terms are also included on the MXit app, which is open to all learners in the country and not just those attending the incubator schools. "We're aiming towards a much bigger support system."

As part of the pilot, the touch screen tablets were also introduced in Grade 10 classes at schools in urban, rural and deep rural areas throughout the region, where research and development is taking place under the auspices of the FRF chair, and in collaboration with the Department of Basic Education and the Meraka Institute at the Centre for Scientific and Industrial Research (CSIR). "This research will continue for the next two years to determine the impact of the model on learner performance," said Olivier.

The techno-blended teaching and learning model is also being utilised in accredited skills development programmes for teachers.

Uitenhage pupils Thandi Oxen (left) and Gcobisa Zuma (right), from Molly Blackburn Senior Secondary School, with Noluvuyo Saki, from Gamble Street Secondary School, learn maths and science using a touch screen tablet. Picture: Liz McHugh

Read more: http://mype.co.za/new/2013/10/benefiting-from-tablets/#ixzz2j6UIO8TQ

Why maths and science should not be dropped

NMMU Maths Development Unit hosts critical public debate on the termination of maths and science in Graaff-Reinet schools

By Nicky Willemse

Maths and science are key to careers in engineering, medicine, accounting and so much more, yet these subjects are quite literally falling by the wayside in the Graaff-Reinet region – and in some cases being dropped from the school curriculum altogether.

On Friday afternoon (2 March), Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU) is hosting an open debate in Graaff-Reinet for teachers and other stakeholders to discuss this matter – and identify solutions.

"Seven of the 16 high schools in this area do not offer science as a subject, three of these schools do not offer maths either, and there are other schools which are also considering dropping maths," said GMMDU head Prof Werner Olivier. "Removing these subjects from the curriculum severely limits the career options of pupils."

Last month (February) in Graaff-Reinet, GMMDU launched a unique 14-week maths and science incubator school for grade 11 and 12 pupils, which uses cutting edge technology to improve pupils' understanding of these subjects.

"In terms of today's debate, GMMDU will be able provide valuable input and also offer potential support in this area," said Olivier.

The debate – which will be followed by a GMMDU workshop for teachers and pupils on the use of Casio calculators, an essential component of the maths and science curricula – will highlight a number of key issues, including the factors that have led to schools canning these subjects.

According to a statement from the Department of Education, these factors include the shortage of qualified maths and science teachers in the rural areas, which often results in teachers not qualified in these subjects having to teach them. Furthermore, teachers do not possess content knowledge and methodology, and lack the confidence to teach these subjects. Teachers are even misallocated, in terms of the grades and subjects they are teaching. Pupils, who often lack a sound foundation resulting from poor teaching in earlier grades, struggle to cope and pass rates are low. In some cases, exam papers do not conform to subject assessment guidelines. Other factors include teacher and pupil absenteeism, a lack of parental support, and a lack of resources.

Olivier said: "Because of the vastness of the area, the teachers' support base is also very limited. They cannot discuss subject-related problems with colleagues at other schools as easily as their counterparts in the cities."

PORT ELIZABETH EXPRESS (Metro)
08 Jan 2014, p.2

NMMU, tech company take maths and science to scholars

REPORTER

SOUTH African tech company, Future Mobile Technology (FMT), has teamed up with the Nelson Mandela Metropolitan University's Govan Mbeki Maths Unit to develop and market the technology needed in the drive towards better results in maths and science.

The result of this partnership is the netsurfer® SCHOLAR, a tablet developed by FMT that comes embedded with 183 hours of preloaded CAPS aligned maths and science educational content developed by the NMMU's Govan Mbeki Maths Development Unit.

FMT joint CEO, Tracy Andersson, said embedding the content on one of their netsurfer® tablets means students in remote areas or lower LSM households without broadband at home don't need to go online in order to access the learning materials.

Graham Davies, joint CEO of FMT, said the company believes in harnessing for the collective good the talents of public and private sectors.

"The university had spent five years developing this fantastic content and because they rely on grant funds and aid from blue chips or NGO's to make it available to learners and teachers, it was limited in scale and was only benefiting a select few.

"Our public private partnership with the NMMU is a first of its kind in South Africa. We approached the NMMU with our commercial model that ensures its continued success and that it is both scalable and sustainable. Profits are re-invested to ensure that content is kept up to date, functionality is continuously improved and it is available on a national scale," said Davies.

Professor Werner Olivier, head of the Govan Mbeki Mathematics Development Unit at the NMMU, said partnerships between private and public sectors "can play a pivotal role to ensure that potential educational benefits of cutting edge technologies are made accessible to aspiring school learner communities."

Professor Olivier believes that, as in the rest of the world, "tablet and mobile technologies combined with quality teaching and learning material could play a critical role to bring content rich virtual classrooms closer to the brick and mortar classrooms.

"Innovative learning platforms that could render independent maths and science learner scaffolding support in South Africa are vital. Especially if viewed against the background of the teacher crisis and lack of access to quality maths and science resource materials in many schools," he said.

FMT's corporate social responsibility bent is to close the digital divide that exists between South Africa's few 'haves' and many 'have not's'.

"It's hugely important to redress the inherent imbalances in our education system," said Andersson. "That's why we've invested in creating technology for the mass market, and have actively sought ways of using that technology to boost education."

Davies concurs. "Technology should help level the playing field, not increase the gap between learners in urban areas and those in rural schools. The pilot study carried out by the NMMU has proved this product works."

The netsurfer® SCHOLAR maths and science content is CAPS-aligned and is based on the National Curriculum Statement (NCS) for grades 10, 11 and 12. It features term-by-term video lessons, experiments, workbooks, solutions and past exam papers taught by highly qualified mathematics and science professors and teachers. Students can pause, rewind and watch video lesson as many times as they wish.

The netsurfer® SCHOLAR has been launched nationwide with The Foschini Group and comes pre-loaded on FMT's netsurfer® Pro 7 Inch Tablet; a high spec, embedded 3G tablet with 16GB built in storage space, for R2999 all-in.

New blow for E Cape pupils

Neo Bodumela

[illegible]

[illegible] the latest shock to hit the failing education system in the Eastern Cape, seven schools in a single area have dropped maths or science – and in some cases both – from their curriculum due to a shortage of skilled teachers.

And the result will be so that "severely" the career options of the pupils in and around Graaff-Reinet, a mathematics educationist warned at the weekend.

The decisions also come as "the province is not doing very well with the economic goals that government has set", according to Eastern Cape Education Department spokesman Loyiso Fanisiso.

"The emphasis though does remain on maths and science," he said.

Nelson Mandela Metropolitan University's Govan Mbeki mathematics development unit Professor Werner Olivier revealed the shocking news during its Karoo lecture on Friday.

"Seven of the 16 high schools in this area do not offer science as a subject, three of these schools do not offer maths either and there are other schools which are also considering dropping maths.

"Because of the vastness of the area, the teachers' support base is also very limited.

"They cannot discuss subject-related problems with colleagues at other schools as easily as their counterparts in the cities," Olivier said.

The dropping of the subjects comes in the wake of the number of pupils who wrote maths in the matric finals having declined from 250 407 in 2009 to 224 625 last year. The pass rate was 68.36.

At the meeting on Friday factors that motivated the decision to drop the subjects from the curriculum were raised. These, according to a statement from NMMU included:

● The shortage of qualified teachers in the rural areas often resulting in teachers not qualified in the subjects having to teach them;

● Teachers not possessing content knowledge and methodology and lacking the confidence to teach these subjects, or being wrongly allocated to teach a different grade of maths and science;

● Pupils who often lack a sound foundation resulting from poor teaching in earlier grades struggling to cope, resulting in low pass rates;

● Some schools contemplating that exam papers did not conform to subject assessment guidelines.

Other obstacles were teacher and pupil absenteeism, a lack of parental support, and a lack of resources.

Olivier said: "Removing these subjects from the curriculum severely limits the career options of pupils."

Confirming the situation, Fanisiso said that although the schools were within their legal rights to drop the two subjects, it was a setback.

"Certain schools offer certain streams, like commercial streams or technical streams."

He added: "The fact is they can add streams or do away with streams.

"We should also consider that the school may require additional educators to teach the streams."

Maths and Science Desktop PC support project implementation in schools in the Somerset East and Cookhouse region

The Govan Mbeki Mathematics Development Unit (GMMDU) of the Nelson Mandela Metropolitan University recently launched a Maths and Science Desktop PC scaffolding support project in schools in Somerset East, Bedford and Cookhouse. The project is an extension of recent GMMDU maths and science initiatives in the region, including learner incubation programmes as well as skills upgrade programmes for educators. According to Prof Werner Olivier, who heads the GMMDU, a number of telling successes emerged from the learner incubation programme recently where similar resource materials were used as a basis. "We are very excited about the potential benefits that flexible after-hours learner access to quality syllabus aligned Maths and Science material could bring" he said.

The desktops are pre-installed with the TouchTutor™ maths and science resource package to provide independent virtual tutoring and support via video content lessons, calculator support, exam revision and learner workbooks. The model is independent of the internet and will provide support for Grades 10 – 12 learners after school hours.

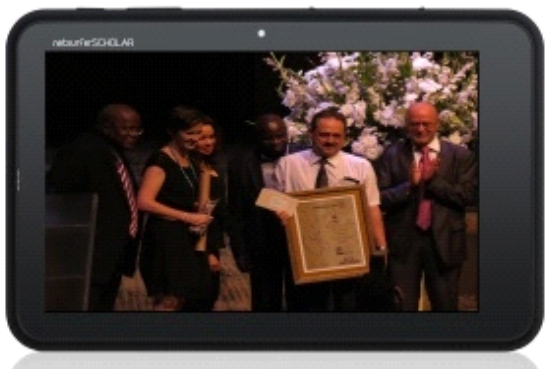
Six schools in the region will benefit from the project, namely, Aeroville High School, Johnson Nqonqoza High School, Gill College, Cookhouse Senior Secondary, Lonwabo High School and Templeton High School. Teachers at these schools will facilitate and monitor access to the support platform which will be placed in secured venues at the schools. The project enjoys the support of the local Department of Basic Education, school principals and teachers.

The initial phase of the project is sponsored by Cennergi and is in partnership with the Dr Ngcipe Foundation and the Blue Crane Development Agency.

Further similar Maths and Science development initiatives in schools in the region are planned for the near-future.

CAPS-aligned maths, science video incubation programme awarded top prize by Impumelelo Social Innovations Centre

Johannesburg, 5 Mar 2014



Prof Jonathan Jansen, Rector and VC of the University of the Free State; Margot Collett, GMMDU; Lynn Husselmann, Liberty Foundation; Maxwell Pirikisi, Liberty Foundation; Prof Werner Olivier, Head, GMMDU; Derek Hanekom, Minister of Science and Technology

The Nelson Mandela Metropolitan University's TouchTutor education content, which is now pre-loaded on Future Mobile Technology's netsurfer SCHOLAR Android tablet under an exclusive licensing agreement, has been awarded one of the coveted Gold Awards for the Maths and Science Incubator School Programme from the Impumelelo Social Innovations Centre. The award was presented by Derek Hanekom, Minister of Science and Technology, and Prof Jonathan Jansen, Rector and Vice-Chancellor of the University of the Free State.

To ensure the TouchTutor lessons are easily accessed by learners and students, FMT has developed a unique software program named ACMEE (Android Content Management System for Education and Enterprise). ACMEE encrypts (DRM protected) the TouchTutor content and enables the content to be categorised into hierarchies and easily navigated in a concise, structured and organised manner.

Over 183 hours (6.5GB) of grades 10, 11 and 12 CAPS syllabus aligned maths and science video lessons and science experiments are pre-loaded onto the netsurfer 16GB cellular Android tablet.

Pre-loaded means no Internet downloads, no reliance on the Internet, and ensures easy, uninterrupted viewing!

This unique audiovisual material was developed over a period of five years. Maths and science lessons are conducted by the highly experienced mathematicians of the Govan Mbeki Maths Development Unit from the Nelson Mandela Metropolitan University and other accomplished teachers.

The resource centre, consisting of video lessons, science experiments, work papers with solutions and past exam papers with answers was previously only available to those involved in development projects of the Govan Mbeki Mathematics Development Unit, but now, through an innovative public private partnership between the NMMU and FMT, it has been made available to all learners and teachers in South Africa.

Results in GMMDU projects have proven that if utilised maximally, the resources can enhance the chances of learners obtaining a university pass grade in maths and science and go on to having a successful career.

The resource can be used as a study aid, to complement a teacher's lesson, as a substitute when a teacher is unable to take the class, or an essential lifeline for those who have no teachers for mathematics or science.

All Touch Tutor material is NCS (National Curriculum Statement) syllabus aligned and CAPS (Curriculum Assessment Policy Statements) amendments are being incorporated according to DBE (Department of Basic Education) requirements. The netsurfer SCHOLAR, Touch Tutor covers the complete syllabi and serves to provide an additional support to learners and educators in the FET (Further Education Training) band. When upgrades are made to the syllabus, it will be available on FMT's Web site: www.futuremobile.biz.

Lessons can be paused while important concepts are explained or watched over again to ensure all concepts are fully understood. It can be used for single viewing on the tablet or for the entire class to see by connecting to a TV or projector using the HDMI port.

Click here to see a sample lesson: http://www.youtube.com/watch?v=fOODBTVnTGI.

PHIL MNISI
Teacher development, to sustain and improve the use of IT systems in pedagogy, remains a critical part of the DBE's elearning strategy

KOBUS VAN WYK
South Africa must provide support for the teachers and learners who form the fabric of the education system

ADELE BOTHA
A culture of lifelong learning among teachers is critical; and enables them to use technology to access information and create new content

MERRYL FORD
The active and transparent use of technology in classrooms enables teachers and pupils to use it as a natural part of the teaching process

understanding through multiple representations. IT-assisted systems make it possible to develop mathematics proficiency, but it is important to focus on good subject matter and not on the technology," he says.

Visualisation enables pupils to explore geometric principles dynamically, for example, by changing the angles and exploring how this changes other angles, to see the effects of the transformation of functions on resultant graphs and also to work with three-dimensional objects, which are difficult for teachers to demonstrate on paper.

"ICT-assisted learning enables effective presentation of mathematical principles quickly and easily. Such programs also enable teachers to use visuals to demonstrate a concept or to demonstrate how to test the proof of a general concept that pupils have developed through exploration and experimentation."

Meanwhile, Council for Scientific and Industrial Research (CSIR) principal researcher Dr **Adele Botha** and CSIR Education and Mobile Learning manager **Merryl Ford** studied the integration of ICT systems and technologies with teaching and learning in the classrooms of rural schools in the remote Cofimvaba area of the Eastern Cape as part of the ICT for rural education development (ICT4RED) initiative.

The active and transparent use of technology in classrooms enables teachers and pupils to become so familiar with technology that using it becomes a natural part of the teaching process, emphasises Ford.

"Using a system that progressively rewards champions in communities as they improve their familiarity and use of the technology is an effective way of encouraging the use of IT systems concurrent with a sense of ownership of the technology," she highlights.

Modern Teaching

Technology in education initiatives must, however, emphasise professional and pedagogical skills development, as well as content development, which remain important in the medium to long term, says Olivier.

"Technology-blended education systems can harness the potential complementary effects of technology and teaching and can also form part of the phased introduction of technology to slowly change the interactive use of technology and physical resources in the classroom," he notes.

The ICT4RED project used a jigsaw approach to introducing technology, which entailed teachers working and using the technology in groups in a simulated classroom environment, while discovering how to perform various functions using the new technology. This process helped teachers to become familiar with the technology and increased their confidence in using the technology for teaching.

Further, teacher development emerged as being more critical than Internet connectivity during the project, as teachers could use existing resources, such as textbooks and digitised workbooks, to create new teaching content using technology, emphasises Ford.

Botha agrees, noting that ICT in education projects can improve the professional development of teachers and enable them to conduct lessons using new technologies, rather than prescribing how and what they must teach.

"Engendering a culture of lifelong learning among teachers is critical; enabling them to use technology to access information and create new content also improves their knowledge of the subject matter, as well as their confidence and innovation when presenting the materials," she says.

ICT in education projects must be demonstrated within the teaching environment to transform teaching practices, she says.

"The results of the project are remarkable. Demonstrating the applications of technology in their teaching environment and providing continuous support for seven months to enable change have resulted in a spillover of good teaching practices into the classroom. Schools and user communities share the knowledge and use of the technologies. This has led to higher cognitive skills being developed in classrooms, as the teachers become more conversant with their subject matter," says Botha.

Further, ICT-assisted education systems can make classrooms pupil-centred and change pedagogy in radical ways, such as introducing flip-classrooms, whereby pupils study the content at home and work through applications and problems at school. During lessons, teachers provide support when knowledge has to be applied and clarify misconceptions, notes Stols.

The new potential roles of teachers to clarify misconceptions and provide support during knowledge application require good content knowledge. A good teacher has mastery over the content of his or her subject and cannot be replaced by ICT. The lack of mathematics content knowledge of many teachers remains the main obstacle to improved mathematics, science and technology teaching, he avers.

"The barriers to better education are not the teachers. It is our lack of understanding that every piece of technology introduced requires an equal effort to train people to use it. We are obsessed with technology rather than education," says Van Wyk.

"One of the task team's recommendations to the Minister is that all initiatives, including IT-assisted learning projects, must strengthen the fabric of the education system.

"To do this, more guidance is needed. We must provide support for the teachers and pupils who form the fabric of the education system. We, therefore, invite partners and encourage the creation of partnerships to improve the fabric of the whole education system in the country," concludes Van Wyk.

All speakers spoke at the National Science and Technology Forum on ICT-assisted education workshop, held last month in Ekurhuleni.

ENGINEERING NEWS COUPON ON PAGE 28 E330328

MAIL & GUARDIAN
10 Feb 2012, p.38

New teaching model

Nicky Willemse

They came from schools without electricity and desks where exams were written in the dark and pupils sometimes wrote standing up. Because their schools lacked science labs, they memorised experiments from textbooks rather than from demonstrations.

As qualified maths and science teachers, they returned last month to their old schools when the school year started. Bongani Msizi completed a three-year teaching qualification at the Nelson Mandela Metropolitan University last year and has now embarked on a year's practical teaching at his alma mater, Lungisa High School, in KwaDwesi, Eastern Cape.

"I've chosen to become a maths and science teacher because most high-school pupils are struggling with these subjects," he said.

In 2008 Msizi was one of several grade 12 pupils selected from underprivileged schools across Port Elizabeth to attend a maths and science incubator school run by the Nelson Mandela Metropolitan University's Govan Mbeki mathematics development unit. The school employs a technology-based teaching and learning model, shared through a DVD series, in its coverage of the grade 11 and 12 maths and science syllabuses.

Msizi and four other newly qualified maths and science teachers — Xolani Tyiwa, Lelethu Dwane, Luzuko Jama and Yusra Raji — were among the top achievers at the incubator school. All received the state's Funza Lushaka bursaries to study teaching.

Tyiwa has returned to his old school, Solomon Mahlangu High, in Uitenhage. "The incubator school helped me to keep on at higher-grade level in both maths and science. I succeeded at the end of my matric year, thanks to it."

He initially wanted to find work straight after matric, but the Funza Lushaka bursary changed his mind. "So many pupils are struggling, mainly because there is a shortage of teachers or the teachers themselves are struggling with the curriculum ... I decided I wanted to help."

Dwane is completing his practical-teaching year at Khumbulani High School in North End, where he used to be a pupil. "Seeing the experiments [at the incubator school] helped us understand and remember them. In grade 11, I got Es for science and maths. But in grade 12, I went up a symbol."

The Funza Lushaka bursary was a chance for Dwane to follow in the footsteps of an inspiring maths and science teacher who "explained everything in detail", and he now feels teaching is his calling.

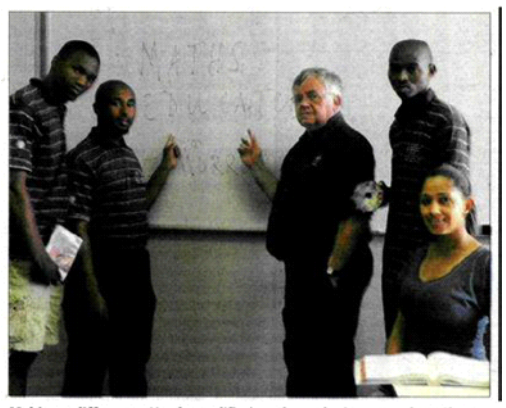
The new teachers will assist in future incubator schools, which are run at various centres in the Eastern Cape and elsewhere in the country, said Professor Werner Olivier, head of the Govan Mbeki mathematics development unit.

"We also plan to use their involvement as part of our ongoing research into the technological teaching model that assisted them," he said.

Nicky Willemse is a freelance writer contracted by the Nelson Mandela Metropolitan University

MAIL & GUARDIAN
10 Feb 2012, p.39

delivers good results



Making a difference: Newly qualified maths and science teachers (from left) Lelethu Dwane, Xolani Tyiwa, Bongani Msizi and Yusra Raji, with Hennie Boshoff from the Nelson Mandela Metropolitan University's Govan Mbeki mathematics development unit

SOMERSET BUDG. / FORT BEAU. ADV. / CRADOCK C.
17 Apr 2014, p.5

Luzuko Tanda, 19.

Zintle Majikazana, 21

Anele Zondi, 18

Tablets awarded for improved marks

SOMERSET EAST
By Nicky Willemse

Hard work – and the help of innovative Saturday maths and science classes – paid off for three Somerset East matriculants, who have each been awarded a tablet for their improved results.

The three – Zintle Majikazana, 21, Luzuko Tanda, 19, and Anele Zondi, 18 – all attended Johnson Ngonqoza Senior Secondary School. Majikazana's final mark for science was 88% – a remarkable jump from her 42% result at the end of Grade 11. She also boosted her maths mark by 16%, achieving a respectable 61% pass at the end of last year.

"My whole life is changing; everything is coming right," said Majikazana, who hopes to study business management next year.

Tanda and Zondi both achieved 62% for their Grade 12 science finals, both improving on their Grade 11 results by almost 20%. For maths, Tanda passed with 41%, bettering his Grade 11 result of 33%, while Zondi passed with 39%, up from 26% in Grade 11.

A high-tech teaching and learning model covering the entire maths and science curriculum – complete with video-based content on Android tablets – are what the three were exposed to in the Saturday incubator school programme (ISP), which they attended in both Grade 11 and 12.

Masterminded by Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU), the aim of the ISP – which has been rolled out in a number of urban and rural districts throughout the province – is to improve maths and science education in South Africa. The unique classroom support package, which includes a laptop for teaching purposes, is called TouchTutor™. In December, the incubator school project – which also includes a MXit-linked glossary and MXit self-assessment – won gold at the prestigious Impumelelo Social Innovations Awards.

Majikazana said the Saturday school improved her understanding of maths and science. "It helped me to achieve my goals."

Tanda, whose dream is to pursue studies in nursing or biochemistry, said the ISP's Android tablet – which functions as a "personal tutor" for pupils – helped him the most. "I was most interested in it because it was something I could see and practice. I watched the lessons again and again, and watched my marks improve again and again. "I'm so excited to be getting my own tablet now."

Zondi said: "It's wonderful to improve your marks – especially in a subject like maths... I used the tablet after school and until late [in the night]." He hopes to pursue studies in civil engineering, agriculture or medicine.

"We are thrilled with the achievement of these students," said GMMDU head Prof Werner Olivier, who also holds a First Rand Foundation Chair in Maths Education. "We've tried to cover as many bases as possible to create exciting and flexible learning environments that are modern and independent of some of the normal constraints of technology at schools and elsewhere."

FREE STATE NEWS - 5 30 Nov - 06 Dec 2012

MATHS TEACHERS GARNER LAPTOPS

By Nthabiseng Lisele

It was a lucky day for mathematics teachers from Motheo, Thabo Mofutsanyana, Xhariep, Fezile Dabi and Lejweleputswa districts as the department of Education recognised their hard work by bestowing them with gifts.

About 120 teachers graduated in Mathematics Skills Upgrade (MATHSUP) programme which the department spent about R 700 000 on, with the Mec for Education, Tate Makgoe personally congratulating them.

A total number of 13 teachers scored HP laptops as they were chosen to be the best maths teachers at their schools and in the district and the rest of the teachers got away bags filled with goodies. The purpose of the programme was to convert maths literacy teachers into pure maths teachers, also to increase the number of learners doing pure maths from 10% to 60% in the province as well as raising the number of grade 12 learners to qualify studying in the fields of science and accountancy at tertiary level.

This skills training programme focuses on improving mathematical content, knowledge and relevant skills of teachers and integrate the use of relevant modern technology to teach maths.

The MATHSUP programme is part of 'Maths for all Campaign' that is also used to popularize pure mathematics and demystify the myth the subject is difficult.

Mec Makgoe said: "Through this campaign, learners will have a better understanding and appreciation of the subject especially that in the province we have crisis of shortage of learners doing mathematics".

According to Mec Makgoe, out of 8 faculties at the University of the Free State only 2 faculties acquire maths subject therefore maths students are scarce.

"Black and coloured students have a large number of students doing maths literacy instead of pure maths according to the stats and in the Free State we are the 3rd in the country regarding grade 12 performance", said Mec Makgoe.

Page 4 5 - 11 December 2012 MANGAUNG ISSUE News

Project upgrades maths teachers' skills

It seems like a lack of skilled mathematics educators could become a thing of the past as 114 educators from 5 Free State Districts finished the year long MathsUp Skills Upgrade course offered by the Nelson Mandela Metropolitan University. A Certificate Ceremony was held on Saturday, 24 November at the Protea Hotel in Bloemfontein to recognise these educators.

The top ten educators who completed their tasks and received the highest marks were also awarded. They are Mrs. H. Bester (HTS Louis Botha Secondary), Mrs. E. Ekstteen (Ficksburg High), M.P. Makhabu (Retshidisitswe High), C.S. Tshabalala (Retshidisitswe), M.A. Lebako (Tikwana Secondary), H. Swanepoel (Marquard Secondary), L.P. Morweng (Ipetleng Secondary), M.E. Mokeki (Boamanelo Secondary), K.G Chake (Albert Moroka) and M.L. Khatile (Lekhuling Secondary).

In his speech the MEC of Education, Mr. Tate Makgoe said there is a crisis in Mathematics in South Africa, adding that most learners are pushed to do maths literacy rather than mathematics. He said he believes this skills upgrade project is one of the best projects to solve the maths crisis.

In Photo: The Education MEC with the Top 10 Educators.
By Pontsho Moqhaisi

MATHWARS DEVELOPERS

Heroes of the day

HATS off to you for making learning fun and accessible. Your ingenuity will, without a doubt, pay off when these pupils' results

30 November - 7 December 2012

DoE awards maths teachers

Giving a lecture ... Prof. Loyiso Jita

Addressing the teachers ... Prof. Olivier

About 120 teachers, including the subject advisers from all five districts, attended the programme

By: Nelunuvo Mkhetho

The department of education has awarded certificates to 111 mathematics teachers and subject advisers, who passed a Mathematics Upgrade (MATHSUP) skills training programme offered at the Nelson Mandela Metropolitan University (NMMU) on Saturday in Bloemfontein.

The programme focuses on improving mathematical content, knowledge and relevant skills of teachers, as well as integrating the use of relevant modern technology to teach mathematics.

About 120 teachers, including the subject advisers from all five districts, attended the skills development programme in the Free State, but only 111 graduated. The department also rewarded the top 10 performers with laptops to help them do their jobs better.

Departmental spokesman, Howard Ndaba, said the purpose of the programme was to convert mathematics literacy teachers into pure mathematics teachers.

It further seeks to increase the number of learners doing mathematics. Ndaba said about R700 000 was spent on the programme and the department aims to increase the mathematics learners' figures from 10 to 60 percent in the province, as well as raise the number of grade 12 learners to qualify studying in the fields of science and accountancy at tertiary level.

Professor Werner Olivier, who heads the Govan Mbeki Mathematics Development Unit (GMMDU) at NMMU, said the MATHSUP programme has been a success, ever since it was launched in 2009.

The Free State province got involved in the programme for the first time this year, since January, and has now reaped positive results. The programme consists of two NMMU accredited short learning programmes that are presented over a one year period.

However, the focus of the structured skills training programme is to improve mathematical content knowledge and relevant skills of teachers and integrate the use of relevant modern technology to teach mathematics effectively at FET level.

"For each short learning programme, a contact sessions structured for five days during the January and July school holiday periods was combined with follow-up weekend sessions. Formal daily assessment opportunities were linked to both contact periods and a formal three hour examination had to be completed for each short learning programme" said Olivier.

Speaking on behalf of the teachers who got the opportunity of upgrade their skills, James Mbangula, thanked the department for giving the teachers this lifetime opportunity.

"We are eager and ready to embrace this opportunities and to upgrade our professional skills in order to teach mathematics more effectively using some of the modern technology based approaches," said Mbangula.

Mbangula said the skills the teachers acquired will help them deal with the daily classroom challenges.

The MEC for education, Tate Makgoe, said MATHSUP is part of the *Maths for all Campaign* that is used to popularise pure mathematics and also to demystify the myth that the subject is difficult.

Makgoe said through the campaign learners will have a better understanding and appreciation of the subject and advised teachers to stand together and help each other to overcame the mathematics crises.

He said out of eight faculties in the university, it is only two that do not require mathematics to be accepted as a student and that kids should be advised to do maths not the maths lit.

"We depend on teachers to save our country, we need more engineers and doctors in our country and I believe that we can beat this problem. The department has managed to give

WEEKEND POST (Sunrise)
08 Feb 2014, p.5

Saturday school the secret of success

GOING to school on a Saturday morning is anathema for most high school kids, but for some savvy matrics it is the difference between mediocrity and success.

A Nelson Bay Metropolitan University-run Saturday incubator school programme was the catalyst for Siyabulela Mzomba, 18, who scored 96% for maths and 87% for science in his final exams.

The ambitious Masiphathisane Senior Secondary School matriculant will soon be starting his BEng (Mechatronics) studies at NMMU.

He is one of several top participants in the maths and science incubator school programme – developed and run by NMMU's Govan Mbeki Mathematics Development Unit (GMMDU) – who are now furthering their studies at the university.

Mzomba said the incubator school helped him gain a thorough understanding of the basics of maths and science.

"After I had grasped the basics, I was able to confront and solve almost any mathematical or scientific problem at school . . . It helped me to improve my marks."

Technology provides excitement to mathematics at all levels

Maths magic

GONE are the days when a text book, a chalk board and the droning voice of a teacher were the only requirements for a school maths lesson.

Maths has become high-tech worldwide – with dynamic software developed to make geometry, algebra, calculus and statistics come alive at all education levels, generating excitement for a subject which, in this country, has lost popularity.

GeoGebra is among the best-known free and easy-to-use educational software for maths globally, having won several awards in Europe and the United States. Our GeoGebra institute – the second in the country and one of 40 similar virtual institutes worldwide – is linked to the international GeoGebra institute at England's Cambridge University, and will be hosting the country's first GeoGebra Conference for maths teachers early next year.

"We want to empower educators to use modern technology to teach maths," said unit head **Prof Werner Olivier**, who also holds the First Rand Foundation Research and Development Chair in Maths Education.

"GeoGebra is designed to facilitate and strengthen the teaching and learning of maths at all levels. It is indeed maths for all and, in particular, allows for simultaneous dynamic visualisation of relations between geometry and algebra – hence the name GeoGebra."

The unit has developed its own unique, technology-based teaching and learning model for teachers and pupils, using cutting-edge electronic media, including GeoGebra, to teach Grade 11 and 12 maths.

One of the ways the unit is sharing this resource is via a DVD series – which allows both learners and teachers to access and facilitate the material in a flexible way through quality tutoring.

Prof Olivier said one of the reasons for establishing the GeoGebra Institute was to "generate excitement for maths, which has a negative image". The institute will conduct teacher training in GeoGebra and also assist with teaching in classrooms".

"As an institute, we will explore further applications of the GeoGebra programme to add to the huge GeoGebra resource base available to teachers and learners and will also research the impact of GeoGebra applications in our classrooms.

Prof Olivier is also collaborating with the Computing Sciences to link GeoGebra applications with mobile computing devices, such as cell phones. Visit www.GeoGebra-nmmu.co.za

*PIONEERS ... Mathematics stalwarts (from left) **Dr Hennie Boshoff, Prof Werner Olivier** and **Peter Weisswange** are the founder members of the new GeoGebra Institute at NMMU bringing high-tech mathematics education to the masses.*

MATHS AT NMMU HAS HIGH-TECH APPEAL

Nicky Willemse
WEEKEND POST CORRESPONDENT

GONE are the days when a text book, a chalkboard and the droning voice of a teacher were the only requirements for a school maths lesson.

Maths has become high-tech worldwide, with dynamic software developed to make geometry, algebra, calculus and statistics come alive at all education levels.

Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit is ensuring the technology trend catches on in Eastern Cape classrooms by launching its own virtual GeoGebra Institute. GeoGebra is among the best-known free and easy-to-use educational software for maths globally, having won several awards in Europe and the US.

The university's GeoGebra Institute – the second in the country and one of 40 worldwide – is linked to the International GeoGebra Institute at England's Cambridge University, and will be hosting the country's first GeoGebra conference next year.

"We want to empower educators to use modern technology to teach maths," unit head Prof Werner Olivier said. "GeoGebra is designed to facilitate and strengthen the teaching and learning of maths at all levels. It is dynamic visual maths for all."

The unit has developed its own unique teaching and learning model which uses cutting-edge electronic media – including GeoGebra – to teach the Grade 11 and 12 national curriculum statement (NCS) maths syllabus.

Olivier said one of the reasons for establishing the institute was to "generate excitement for maths", and that the institute would "research the impact of GeoGebra applications in our classrooms".

Olivier is also collaborating with the university's Computing Sciences department to link GeoGebra applications with mobile computing devices, such as cellphones.

R Diza, AV Christoffels, E Lewis and B Koeberg are the staff members in charge of the 2012 Incubator School Project.

BURGER (Oos Kaap)
19 Feb 2013, p.3

Tablette help met onderrig en leer

Ilse Krige

Gr. 11- en 12-leerders wat vanjaar deelneem aan die wetenskap- en wiskundeskool, aangebied deur die Nelson Mandela Metropolitaanse Universiteit, het die naweek op Graaff-Reinet van die voorste tegnologie ontvang, geborg deur Chevron SA. Op die foto bekyk (van links) Bianca Williams van die Volkskool, Miranda Anthony van Chevron Suid-Afrika en Mashudu Mulaudzi van Spandau Sekondêre Skool die nuwe raakskerm-rekenaar. Foto: FRANCOIS ELS

PORT ELIZABETH. – Splinternuwe iPads is die naweek aan 180 leerders van 15 deelnemende skole in die Graaff-Reinet- en Cradock-distrikte geskenk.

Chevron Suid-Afrika, in vennootskap met die Nelson Mandela Metropolitaanse Universiteit (NMMU), finansier die Govan Mbeki wiskunde-ontwikkelingseenheid waardeur sekere skole in die Oos-Kaap met wiskunde en wetenskap gehelp word.

Miranda Anthony, maatskaplike beleggingsbestuurder van Chevron, het verduidelik die program, wat 16 weke duur, word in ses gebiede aangebied.

"Dit is 'n unieke, tegnologie-gebaseerde onderrig-en-leermodel wat die gr. 11 en 12 wiskunde- en wetenskapleerplanne behels. Tans neem 620 leerders aan die program deel."

Chevron het die afgelope naweek eers leerders in die Graaff-Reinet-distrik verras met die hardeware. Daarna het die Cradock-distrik se leerders aan die beurt gekom, volgens Anthony.

Virginia Christoffels, koördineerder van die program en ook lewenswetenskappe-onderwyseres by Spandau Sekondêre Skool, was verheug oor die "groot geskenk".

"Die kinders was vreeslik opgewonde. Hulle is gemotiveerd, want die uitdaging is aan hulle gestel as hulle hul wiskunde- en fisiese wetenskappunte met 10% kan verbeter, mag hulle die tablette hou," het sy gesê.

Prof. Werner Olivier, hoof van die Govan Mbeki Wiskunde-ontwikkelingseenheid by die NMMU, het gesê: "Daar bestaan 'n dringende behoefte om innoverende modelle te ontwerp, en leerders met potensiaal in wiskunde en wetenskap te identifiseer.

"Die beguntigde leerders ontvang raakskermtablette as leerhulpbronne. Dié rekenaar dien as 'n 24/7-leermeester met die druk van 'n knoppie."

Olivier het bygevoeg leerders kan selfs interaktief leer deur toegang tot 'n databank van kurrikulum-gerigte vrae wat hulle deur MXit kan bereik.

COVERSTORY
ICT & EDUCATION

Digital Classrooms

Technology reshaping education, but teachers key to positive outcomes

SCHALK BURGER | SENIOR STAFF WRITER

DIGITAL CLASSROOM
Learners at a Cofimvaba school using tablets during class as part of the ICT for rural education development initiative

Teaching children using digital technologies promises benefits and methods to improve education, but it requires familiarity, pedagogical adaptations and consistent support, according to a panel of experts at the National Science and Technology Forum Workshop on information-and-communication-technology (ICT)-assisted education solutions.

The manner in which children learn and people access information has changed dramatically since the blackboard was invented in 1801, yet South Africa expects its Whatsapping and Mxiting children to pay attention when technology that is more than 200 years old is used, quips information technology (IT)-assisted learning Ministerial task team member and ICT equipment company Mustek electronic-learning head **Kobus van Wyk**.

"South Africa must change with the times and remove the barriers to IT-assisted learning."

However, Van Wyk is quick to emphasise that most ICT projects for education focus on the technology to be used, rather than on education, which must remain the sole focus of any education initiative.

"Technology changes quickly. If you try to implement the newest technology each time, you end up chasing rainbows. Similarly, fast Internet connectivity is neither a barrier nor a panacea. We think that providing fast Internet connectivity will open children's minds and they will suddenly have all the necessary skills.

"This is obviously a fallacy. The Internet is only a source of information, albeit an important one. Lack of connectivity is a hurdle, not a barrier. The main barriers to IT-assisted learning are that we do not know how to implement IT systems to help improve the education system."

The only suitable way of measuring the success of IT in education is the extent to which it improves academic results, notes Van Wyk.

Department of Basic Education (DBE) curriculum innovation and elearning director **Phil Mnisi** concurs, noting that the significant progress of the roll-out of IT systems at schools has not been matched by a commensurate positive impact on education nor effective use of the systems.

Further, public initiatives, such as the costly and ineffective Gauteng Online project and a plethora of private initiatives have failed to make a long-lasting impact on the use of electronic media and technologies at schools, mainly owing to a focus on technologies and a lack of sustained support for ICT in education initiatives.

"Teacher development, to sustain and improve the use of these systems in pedagogy, remains a critical part of the DBE's elearning strategy, and every learner and teacher must have access to electronic content when technologies are introduced. These two conditions must also be implemented as part of any IT-assisted education project," says Mnisi.

The DBE faces the problem of how to implement new IT-assisted education in a modern information society, while preventing any adverse impacts on the education progress of learners.

Changing Education

Nelson Mandela Metropolitan University FirstRand Foundation chair in mathematics education and Govan Mbeki mathematics development unit professor **Werner Olivier** investigated the use of mathematics and physical science technology systems in secondary schools.

"The current generation of 12- to 18-year-old pupils is comfortable with technology and able to use it. There are also considerable potential benefits in using new teaching techniques to improve the development of mathematics and science skills to enable improved progression and continuity from secondary education to higher education."

Technology-blended teaching systems offer instant feedback, which means that misconceptions can be corrected in class, rather than after formal tests. Further, collaboration and exploration of mathematics and science principles can help bridge the divide between teachers and pupils, in general, Olivier notes.

He emphasises that the progress of pupils into higher education must be improved. "Higher education systems must, thus, have an overarching progressive incubation structure that facilitates the independent development of secondary school learners, regardless of what happens during class.

"Innovative use of different and Web-based independent IT systems that are compatible with teaching in secondary schools can be used as scaffolding to support teachers and pupils. The technology projects must also be suitable for the economic circumstances of schools to be effective and must be affordable, sustainable and scalable."

More sophisticated systems can then be introduced and used with basic educational support systems.

Meanwhile, University of Pretoria professor **Gerrit Stols** studied ICT-assisted solutions for mathematics in schools and found that an IT-assisted learning system is not an immediate, easy solution to solve problems in education – specifically for mathematics – because most systems for mathematics focus only on the procedural learning aspect of this subject.

However, innovative mathematics IT systems can boost the acquisition of mathematics proficiency skills by enabling learners to experiment and explore, thereby encouraging them to make discoveries that they can generalise and then test to verify their results.

"Visualisation is important for the discovery process and enables a rich conceptu

HERALD (Morning Final)
10 Dec 2013, p.5

Innovative Bay projects honoured

NMMU maths programme one of three to grab national awards

Zandile Mbabela
mbabelaz@timesmedia.co.za

A NELSON Mandela Metropolitan University (NMMU) project was one of three Port Elizabeth-based projects to receive top honours at the Impumelelo Social Innovation Awards last week.

The university's Govan Mbeki Maths Development Unit (GMMDU), the GM Foundation's Walmer Link housing project and the Hope Factory walked away with the gold, platinum and silver awards respectively at a glitzy ceremony in Cape Town's Baxter Theatre last Sunday. They were among 25 projects from around the country recognised for offering innovative solutions to, among other things, the country's maths and science challenge, enterprise development and youth leadership.

The Walmer Link housing project, which won R50 000, offers affordable homes to lower income earners. North End's Hope Factory, which walked away with R20 000, helps budding entrepreneurs get off their feet. The university's innovative use of tablets and social media platforms like Mxit to help struggling pupils improve their performance in maths earned it the R40 000 gold award.

The Maths and Science Incubator School Programme, run by the university's GMMDU, has been a lifeline for pupils in four urban and rural districts in the Eastern Cape for the past seven years.

More than 2 000 pupils were hand-picked for the programme after showing great potential in maths and science. GMMDU head Professor Werner Olivier thanked everyone who had a hand in the success of the programme – from the national Education Department to the programme sponsors. At its inception, the programme saw pupils attending extra classes every Saturday, but that did not yield the desired results and a more accessible form was developed. Mxit and Android tablets were used this year as an interactive way of teaching maths and doing self assessments, with 530 pupils in grades 10 to 12 from about 89 previously disadvantaged schools in the province benefiting.

This meant pupils were afforded around the clock maths tutoring through video-based content that does not need an internet connection.

Olivier said: "We're aiming to use the latest technology to close the gap between teaching and learning, in terms of the expectations of the new Generation Z, which is also called the 'Facebook Generation' or the 'Screen Generation'."

Maths whizz kids get Mxit boost

By NICKY WILLEMSE

NMMU, tech company take maths and science to scholars

PORT ELIZABETH EXPRESS (Metro)
08 Jan 2014, p.2

REPORTER

SOUTH African tech company, Future Mobile Technology (FMT), has teamed up with the Nelson Mandela Metropolitan University's Govan Mbeki Maths Unit to develop and market the technology needed in the drive towards better results in maths and science.

The result of this partnership is the netsurfer® SCHOLAR, a tablet developed by FMT that comes embedded with 183 hours of preloaded CAPS aligned maths and science educational content developed by the NMMU's Govan Mbeki Maths Development Unit.

FMT joint CEO, Tracy Andersson, said embedding the content on one of their netsurfer® tablets means students in remote areas or lower LSM households without broadband at home don't need to go online in order to access the learning materials.

Graham Davies, joint CEO of FMT, said the company believes in harnessing for the collective good the talents of public and private sectors.

"The university had spent five years developing this fantastic content and because they rely on grant funds and aid from blue chips or NGO's to make it available to learners and teachers, it was limited in scale and was only benefiting a select few.

"Our public private partnership with the NMMU is a first of its kind in South Africa. We approached the NMMU with our commercial model that ensures its continued success and that it is both scalable and sustainable. Profits are re-invested to ensure that content is kept up to date, functionality is continuously improved and it is available on a national scale," said Davies.

Professor Werner Olivier, head of the Govan Mbeki Mathematics Development Unit at the NMMU, said partnerships between private and public sectors "can play a pivotal role to ensure that potential educational benefits of cutting edge technologies are made accessible to aspiring school learner communities."

Professor Olivier believes that, as in the rest of the world, "tablet and mobile technologies combined with quality teaching and learning material could play a critical role to bring content rich virtual classrooms closer to the brick and mortar classrooms.

"Innovative learning platforms that could render independent maths and science learner scaffolding support in South Africa are vital. Especially if viewed against the background of the teacher crisis and lack of access to quality maths and science resource materials in many schools," he said.

FMT's corporate social responsibility bent is to close the digital divide that exists between South Africa's few 'haves' and many 'have not's'.

"It's hugely important to redress the inherent imbalances in our education system," said Andersson. "That's why we've invested in creating technology for the mass market, and have actively sought ways of using that technology to boost education."

Davies concurs. "Technology should help level the playing field, not increase the gap between learners in urban areas and those in rural schools. The pilot study carried out by the NMMU has proved this product works."

The netsurfer® SCHOLAR maths and science content is CAPS-aligned and is based on the National Curriculum Statement (NCS) for grades 10, 11 and 12. It features term-by-term video lessons, experiments, workbooks, solutions and past exam papers taught by highly qualified mathematics and science professors and teachers. Students can pause, rewind and watch video lesson as many times as they wish.

The netsurfer® SCHOLAR has been launched nationwide with The Foschini Group and comes pre-loaded on FMT's netsurfer® Pro 7 Inch Tablet; a high spec, embedded 3G tablet with 16GB built in storage space, for R2999 all-in.

DAILY SUN
21 Jun 2013, p.29

Technology makes learning much easier

By GLACIER NKHWASHU and NICKY WILLEMSE

THERE are new ways of learning maths and science for Eastern Cape pupils!

This is done through touch screen technology combined with MXit – Africa's biggest social network and free mobile instant messenger.

Across the developing world, technology-based educational material such as the global "one laptop per child" initiative is revolutionising classrooms.

Technology is also transforming South Africa's education system, but few programmes are as sophisticated as the maths and science techno-blended model developed by Nelson Mandela Metropolitan University's Govan Mbeki Maths Development Unit.

Using touch screen tablets for pupils and laptops for teachers, it is a unique teaching and learning model that provides curriculum-aligned, video-based content.

MXit is used for tests, exam paper revision and also provides a glossary of terms.

Termed the TouchTutorTM resource package, it is been used to improve teaching from grades 10 to 12 in the four worst-performing districts of the Eastern Cape through an initiative funded by the Department of Basic Education.

It is reaching deep rural schools in the province through a separate partnership with the Meraka Institute at the Centre for Scientific and Industrial Research.

It is also being used in a pilot project to boost the skills levels of maths teachers at Further Education and Training Colleges.

Professor Werner Olivier, the head of the maths development unit, who also holds a First Rand Foundation Chair in Maths Education, said: "We've tried to cover as many bases as possible to create exciting and flexible learning environments.

"They are modern and independent of some of the normal constraints of technology at schools and elsewhere."

Thandile Danster, a grade 12 pupil at Khumbulani High School in Port Elizabeth, takes a high-tech approach to learning maths and science.
Photo by Liz McHugh

HERALD (Morning Final)
04 Dec 2013, p.7

IN THE MIX: Stirling High Grade 11 pupils Kevin May, 17, top achiever for Grade 11 in the MathMxit olympiad, left, and Jaison Zachariah, 17 Picture: NICKY WILLEMSE

Bright pupils Mxit up in hi-tech maths olympiad

Nicky Willemse

MXIT added a thoroughly modern twist to the Eastern Cape's maths olympiad this year – with top achievers fittingly rewarded with top technology as prizes.

Six hundred pupils from 40 schools in 11 districts of the province put thumb to button or screen to answer 20 curriculum-aligned multiple-choice questions in the first round for grades 9 and 11 in August.

A second round followed in September until just a handful of the province's most talented young mathematicians were left to sweat it out in the third round in October.

Among the Grade 11s, Stirling High's Kevin May came first, winning an HP laptop, Pearson's Nikhita Lalloo placed second, taking home an Android tablet, and Alexander Road High's Cara Bee Gedald in third place won a Casio watch. Among the Grade 9s, Grey High's Bradley Meacroft and Jonathan Southwood took first and second place respectively, with Pearson's Justin Tallerkin coming third. They received the same prizes as the Grade 11s.

The Capitec-sponsored competition – called Math Mxit – was the brainchild of Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU), which has for many years been pioneering technology-based interventions to support maths and science education in South Africa.

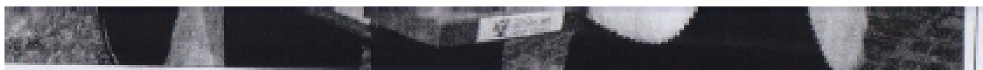
GMMDU head Professor Werner Olivier, who also occupies the university's First Rand Foundation chair in Mathematics Education, said the idea behind the Mxit-based competition was to make it more attractive to today's "screen generation" teens and also more accessible to pupils throughout the province, including those in rural districts, who had previously not participated in the competition.

"We live in a totally different era. Young people today can't imagine a world without a remote control or a mouse. They are highly connected to technology and see technology as an essential part of their lives . . . It's time we responded to their needs and expectations in the context of the education system. This should be part of the approach to address the crisis."

Pupils who achieved platinum (more than 85% in all three rounds), gold (between 75% and 85%) and silver (between 65% and 75%) attended the prize-giving.

May, 17, the top Grade 11 pupil, said: "[The olympiad] was very different to ordinary pen and paper olympiads. It was more modern and felt good for the environment."

Olivier, who worked hand in hand with the Department of Basic Education and the Association for Mathematics Education of South Africa (Amesa) on the olympiad, said the competition was also being used to build awareness about the leading-edge techno-blended teaching and learning model the unit had developed to assist schools.



CREAM OF THE CROP: The Eastern Cape's top matrics for 2013 are, from left, Joanna Taylor of Collegiate, Matthew Walker of Alexander Road High and Danielle de Klerk of Clarendon Girls' High Picture: JUDY DE VEGA

Elizabeth – was Ntomboxolo Jack of Northern Lights Special School in Cotswold, with scores of 81% in maths and 93% in business studies.

In the historically disadvantaged category, East London's Thembekani Gwegwana of Khulani Commercial School took top spot, followed by Thembalihle Mdabula of Cofimvaba and Renalelona Maumo from Mt Fletcher.

Port Elizabeth's top matric was Nicola Sankey of Collegiate with an aggregate above 90%, while Milan Gajjar of Muir College Boys' High was top of the vast Uitenhage district.

The top-performing pupils in township schools were, for Port Elizabeth, Athini Majali of Masiphathisane High School in Motherwell, and, in Uitenhage, Akhona Zenani of Molly Blackburn Senior Secondary.

An incredulous Majali said she was "excited and overwhelmed" by the recognition and looked forward to her journalism studies at Rhodes University in Grahamstown.

"I was going to study through a [National Students Financial Aid Scheme] loan, so this bursary will definitely come in handy."

Port Elizabeth district director Nyathi Ntsiko was beaming with pride and battled to express how he felt about the city's performance.

"I'm so, so, so proud to see the top two pupils [in the province] coming from PE," he said. "Even more special is that those schools are the very same ones that approached the department to see how they could help struggling schools."

Alexander Road High principal Peter Manser said he was "extremely proud" of Walker, who he described as a "very humble and special young man". Other top achievers in the various districts included:

- Graaff-Reinet – Louise-Mari Zietsman of Gill College;
- Grahamstown – Vivienne Dames of Victoria Girls' High;
- Fort Beaufort – Kamvelihle Tabata of Phandulwazi Agric High;
- East London – Arun Sajeev of Selbourne College Boys High; and
- Cradock – Taskia Istain of Middelburg High School.

For the historically disadvantaged category, the top achievers were:

- Grahamstown – Aviwe Menze of TEM Mrwetyana Secior Secondary School;
- Graaff-Reinet – Amandla Makubalo of Aeroville Senior Secondary;
- Fort Beaufort – Lindokuhle Mzileni of Nzululwazi High; and
- Cradock – Janome Montaqu of Michausdal Senior Secondary.

Learners on the ISP 2013

Education goes high-tech

NMMU launches programme for PCs, touch-screen tablets

Herald Reporter

> This is as good as it gets, in terms of the latest technology

HIGH-TECH TUTOR: Grade 11 pupils from Khumbulani High School in Port Elizabeth (from left) Thandile Danster, ...

NICKY WILLEMSE

Timely lifeline for maths, science pupils

Visual dynamic Maths for 21st century classrooms

South Africa's second conference on GeoGebra – the free mathematics software that is stimulating interest and understanding in countless maths classrooms worldwide took place at Nelson Mandela Metropolitan University last week.

About 60 teachers attended the two-day conference, hosted for the second year by the university's GeoGebra satellite institute – one of 145 in 65 countries worldwide, and the third to be started in Africa.

The open-source dynamic software, which allows teachers and pupils to visualise and experiment with geometry, algebra, tables, graphing, calculus and statistics, has proved such a hit worldwide – particularly in Europe – that Google included GeoGebra in its Google Chrome operating system, for even wider access. Keynote speaker Mr Balazs Koren, from Hungary, who is coordinating the development of GeoGebra Institutes worldwide, said the software, first developed in 2001, had been translated into 58 languages worldwide – and had captured the interest of teachers and pupils to such a degree that some pupils had even written books about their research.

Prof Werner Olivier, who chairs NMMU's GeoGebra satellite institute, said: "The huge challenges in mathematics education and the extent to which the use of technology is absent in South African schools is well-known. This conference seeks to promote the appropriate and effective use of Information and Communication Technology (ICT) in maths classrooms by exposing local educators to software and technological pedagogy that are used successfully to teach mathematics abroad."

GeoGebra is open-source, which means that the original software developed by Markus Hohenwarter – who came up with the concept for his masters studies in mathematics education and computer science at the Universityof Salzburg, Austria – can be further developed by the teachers who use it. "There are 25,000 such online learning objects uploaded onto GeoGebra Wiki – and we have six million downloads a year in 190 countries. GeoGebra has also been introduced into maths textbooks in 30 countries," said Koren.

Over the past two years, more than 300 in-service mathematics teachers have been exposed to GeoGebra training as part of the accredited Maths Skills Upgrade Programme that is run by the Govan Mbeki Mathematics Development Unit at the NMMU.

"GeoGebra conference events are just another link in the chain of opportunities that are being created to support teachers as professional practitioners to improve the quality of mathematics teaching at secondary schools in the province," Olivier said.

Countries such as Spain, Brazil and Argentina are installing GeoGebra in millions of e-books for use by school pupils.

The technology has won a string of European and United States awards, including the European Academic Software Award in 2002 and the Association for Educational Communication and Technology (AECT) Award in 2008. "We want to create a network of people in different countries and continents working together on the same idea."

The technology was originally developed for high schools, but the worldwide community using it has since developed versions for primary school and even tertiary level.

Some of GeoGebra's other applications include GeoGebra Mobile, which allows GeoGebra to be used on any smart phone, tablet or touch device, GeoGebra Tube, where files can be uploaded, downloaded and rated by users. Future plans include GeoGebra 3D, for three dimensional geometry which can even be viewed with 3D glasses, and GeoGebra Touch for use on interactive whiteboards or touch screen computers. GeoGebra is also being developed for STEM (Science, Technology, Engineering and Mathematics) education. For instance, a pupil could measure electricity, light or temperature, link their results to their computers, and analyse them using GeoGebra.

The conference also forms part of more comprehensive research and development initiatives linked to NMMU's Govan Mbeki Mathematics Development Unit and its First Rand Foundation (FRF) Chair in Maths Education programmes.

New mobile app for maths

OUR Computing Sciences Department has joined forces with the Govan Mbeki MathematicsDevelopment Unit (GMMDU) to provide Grade 12 learners with a new Mobile Mathematics App to improve their maths knowledge.

"Combining the syllabus expertise of the GMMDU with our department's expertise in developing mobile applications, gives us a unique opportunity to make a contribution towards the teaching of maths in our country," says Computing Sciences Department Head Prof Jean Greyling. According to Prof Werner Olivier, head of the GMMDU and First Rand Foundation Chair in Maths Education, there is a critical need to move away from the exclusivity of traditional delivery of learning maths.

"Technology has brought about a colourful spectrum of new ways to construct meaning through different modes of techno-interaction. The Mobile Maths App adds yet another exciting layer for learners to engage independently with a variety of mathematical ideas and experiences," says Prof Olivier. In Version 1, participants will be able to test their maths knowledge, compete for the top spot in one of 10 levels, as well as overall position. More than 3 000 multiple choice questions, ranging from basic arithmetic to Grade 12 Maths have been entered into the database.

Later versions will include a maths glossary, dual challenges between participants, detailed maths syllabus content, as well as tutorials. "We find that MXit reaches mainly learners from disadvantaged communities, and therefore this is a priority to us," says Computing Sciences' Dr Melisa Koorsse, the main developer in the group.

HIGH-TECH TEACHING TOOL: Putting the spotlight on maths software GeoGebra, which is used by millions of teachers and pupils worldwide, are (from left) Dr Hennie Boshoff, GMMDU, NMMU, Dr Gerrit Stols, University of Pretoria, Mr Balazs Koren, who runs the International GeoGebra Institute community of practice operations in Budapest, Hungary and Prof Werner Olivier, FRF Chair in Maths Education and head of Nelson Mandela Metropolitan University's Govan Mbeki Maths Development Unit.

Benefiting from Tablets

Android tablets and MXit testing provided an über-modern approach to learning maths and science for 530 Grade 10 to 12 pupils from 80 previously-disadvantaged schools.

They were exposed to the technology as part of a one-year pilot study linked to Saturday maths and science "incubator" schools, which were run by Nelson Mandela Metropolitan University's Govan Mbeki Mathematics Development Unit (GMMDU) in six districts of the Eastern Cape to supplement classroom instruction, which in many cases is not up to par.

The recent completion of the six schools – which took place in Port Elizabeth, Uitenhage, Humansdorp, Somerset East, Graaff-Reinet and Cradock – marked the successful end of the pilot study, in which the cutting-edge technology and support package called TouchTutorTM was implemented in the incubator schools.

GMMDU has run the constantly-evolving and expanding incubator schools for the past seven years – but this year was the first that every pupil received a tablet with curriculum-aligned video-based content to act as a "24/7 personal tutor". It was also the first year that allowed for independent self-assessment via MXit.

"It is the first time in South Africa a school like this has been run – it follows global trends in education," said GMMDU head Prof Werner Olivier. The high-tech blended teaching and learning model was researched and developed by GMMDU and NMMU's First Rand Foundation research chair, occupied by Olivier. "We're aiming to use the latest technology to close the gap between teaching and learning, in terms of the expectations of the new Generation Z, which is also called the 'Facebook Generation' or the 'Screen Generation'."

The model, which blends different technologies, is not dependent on Internet access or Windows skills and its material is "100% aligned" to the new CAPS curriculum.

In anonymous feedback surveys carried out at the incubator schools, one pupil described the new technology as a "lifesaver". "It made learning fun, with access to information at my fingertips... It was a valuable friend that was lifesaving with maths and science." Another wrote: "The tablet and TouchTutor really helped when I did not understand the teacher, I could just go home and look at the video of the topic I did not understand. It was a huge advantage and improved my understanding of maths a lot. Working through past question papers on the tablet also proved very useful."

Many wrote of improved school marks. "Not only has it helped me but it has also helped my friends," wrote another.

Olivier said the use of MXit for assessment was not without its challenges, which were being researched and addressed. "Essentially, you're taking maths as you see it in a textbook and putting it onto a [mobile phone] screen. We're very excited about the possibilities."

Old exam papers and a glossary of maths and science terms are also included on the MXit app, which is open to all learners in the country and not just those attending the incubator schools. "We're aiming towards a much bigger support system."

As part of the pilot, the touch screen tablets were also introduced in Grade 10 classes at schools in urban, rural and deep rural areas throughout the region, where research and development is taking place under the auspices of the FRF chair, and in collaboration with the Department of Basic Education and the Meraka Institute at the Centre for Scientific and Industrial Research (CSIR). "This research will continue for the next two years to determine the impact of the model on learner performance," said Olivier.

The techno-blended teaching and learning model is also being utilised in accredited skills development programmes for teachers.